



A Vision for Environmental Services in the GOES-R Era

**Third GOES-R Users' Conference
Broomfield, Colorado**

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Director, National Weather Service**

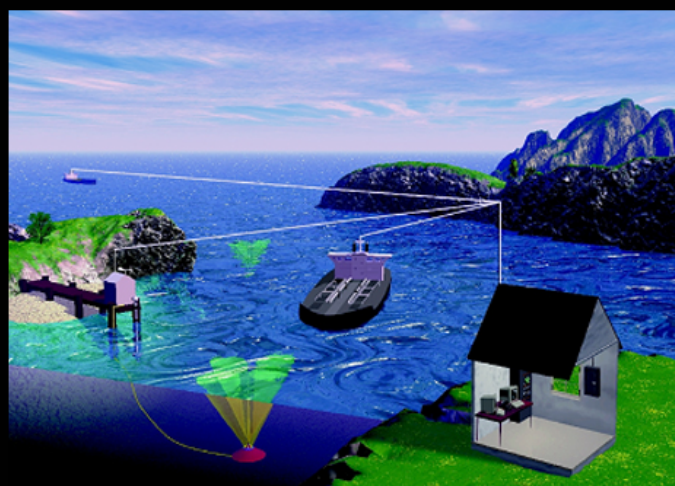
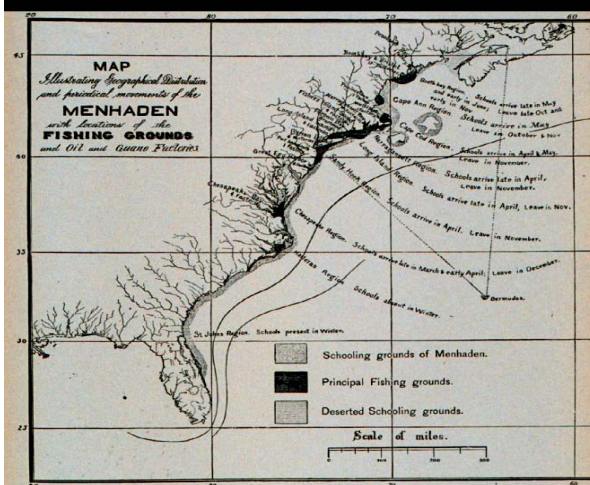
May 10, 2004

Overview

- **The Vision**
- **Understanding the Earth System**
- **It Begins With Observations**
- **Services in the GOES-R Era**
- **Current Scenario... Tomorrow's???**

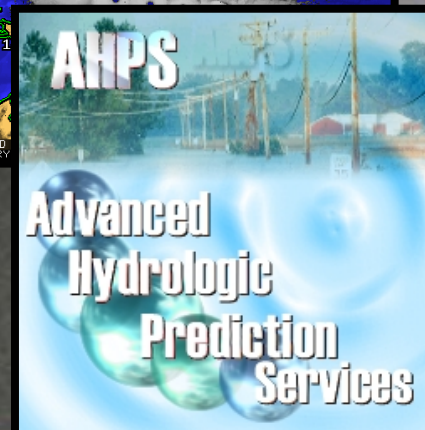
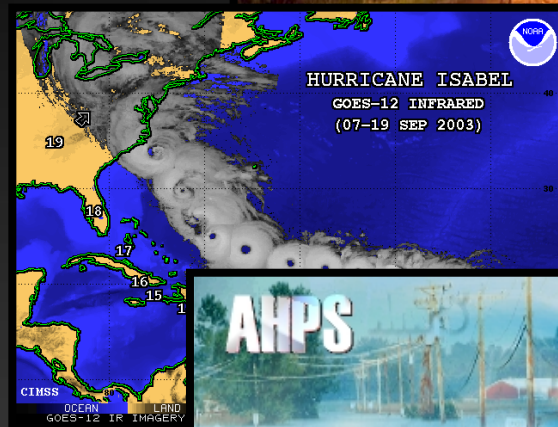
NOAA Vision

- To move NOAA into the 21st Century scientifically and operationally, in the same interrelated manner as the environment that we **observe and forecast**, while recognizing the link between our global economy and our planet's ecology.



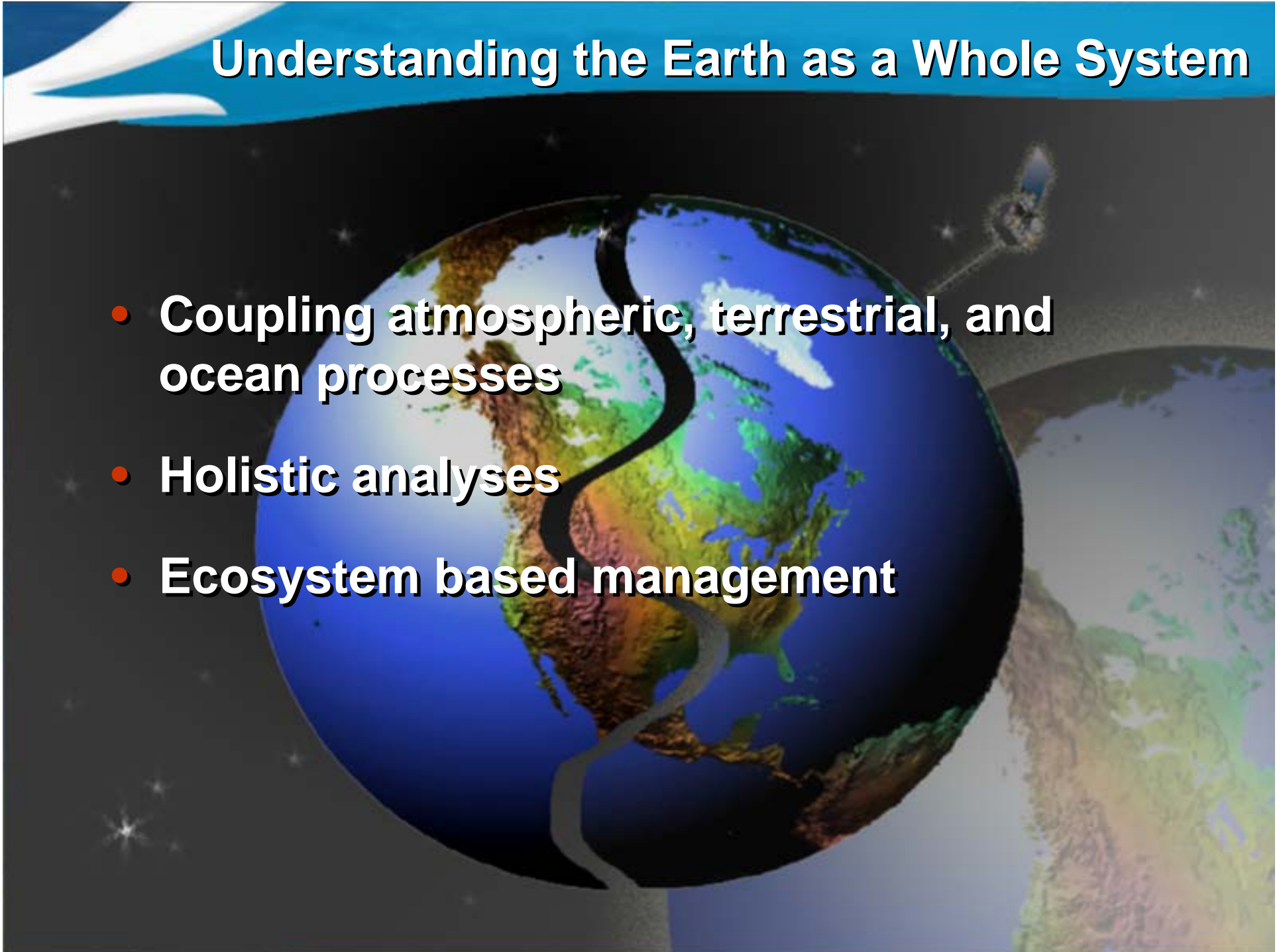
We Can Not Stand Still

- ✓ Users' Needs Continue and Evolve
- ✓ Science and Technology Continue to Advance



Understanding the Earth as a Whole System

- **Coupling atmospheric, terrestrial, and ocean processes**
- **Holistic analyses**
- **Ecosystem based management**



It Begins with Observations

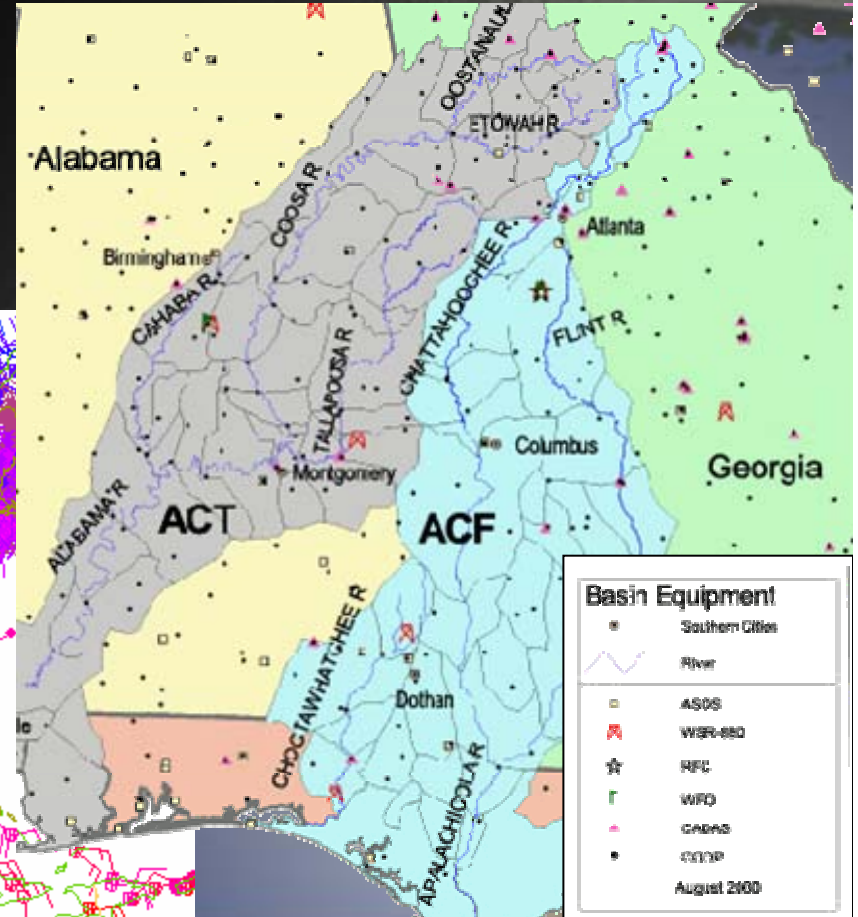
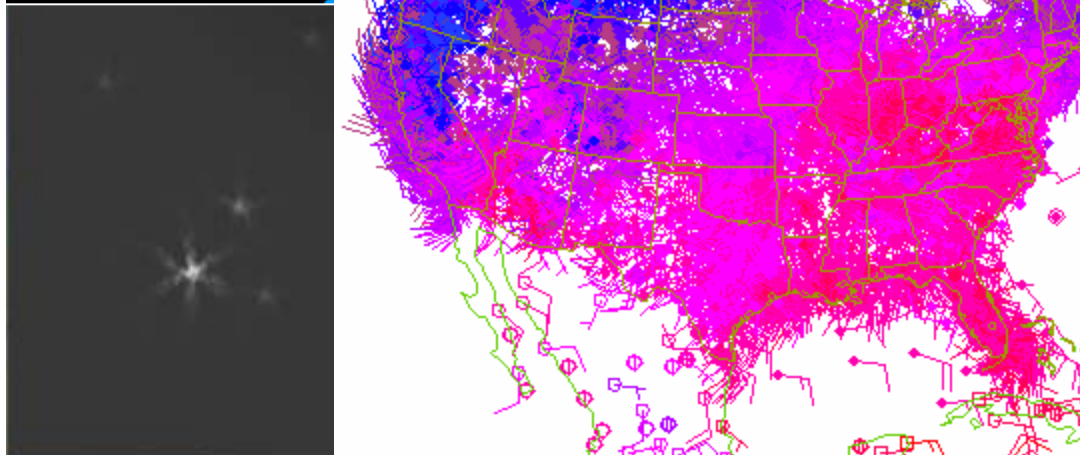
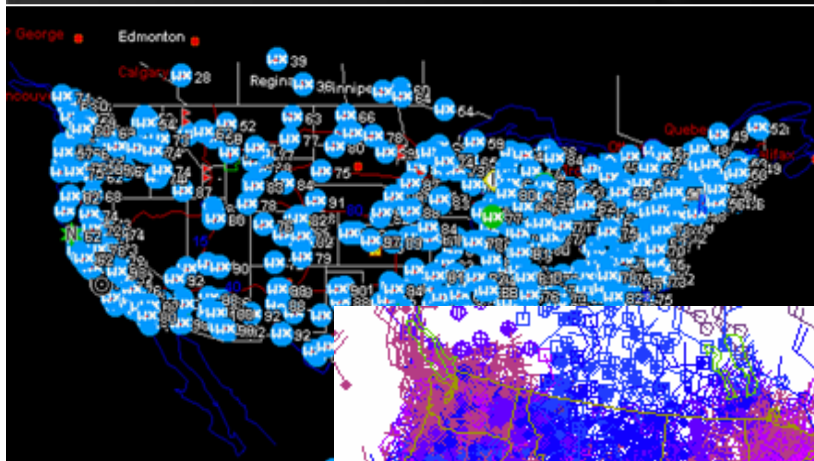
A composite image illustrating various observation platforms. The top portion shows a satellite in space against a black background with stars. Below the satellite, the Earth's surface is visible, showing clouds and landmasses. In the middle ground, a large research ship is on the ocean's surface. To the right of the ship, a small red and white buoy floats. In the bottom foreground, a submersible is visible underwater, surrounded by marine life. The overall scene represents the multi-layered observation system of NOAA.

NOAA Today:

- Decentralized observing responsibility
- 99 observing platforms
- 521 environmental parameters

Increasing Earth Observing Systems

- International Observations
- Private Networks





EARTH OBSERVATION SUMMIT II

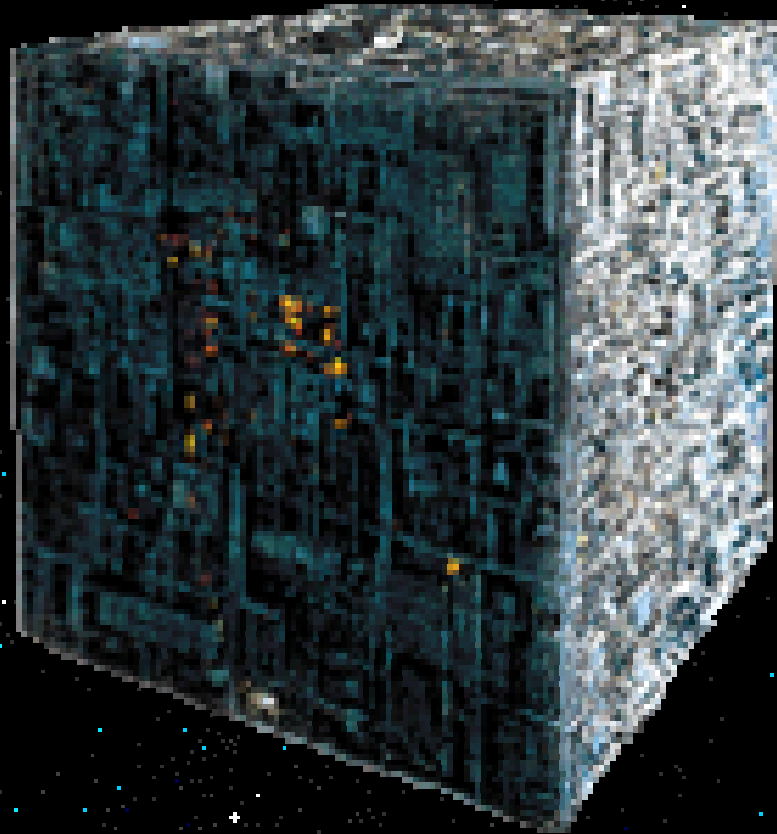
“Right now many thousands of *separate* technological assets are demonstrating their value around the globe, in estimating crop yields, monitoring water and air quality, improving airline safety, and forecasting life-threatening natural hazards. But this technology is not set up to talk to each other. Once linked as a system of systems, the societal pay-offs will be as broad as the planet itself.”

- Mike Leavitt, EPA Administrator

Integrated Observing Systems

- **Build an effective “system-of-systems” infrastructure**
 - *Transform ground-based “stove-piped” observations into an integrated system*
 - *Enhance performance, continuity, and interoperability across NOAA*
 - *Bridge and coordinate research-to-operations across all Mission Goals*
- **NOAA Observing System Architecture**

We Will Assimilate



Services in the GOES-R Era

- **Environmental Situational Awareness**
- **Environmental Situational Understanding**
- **Action!**



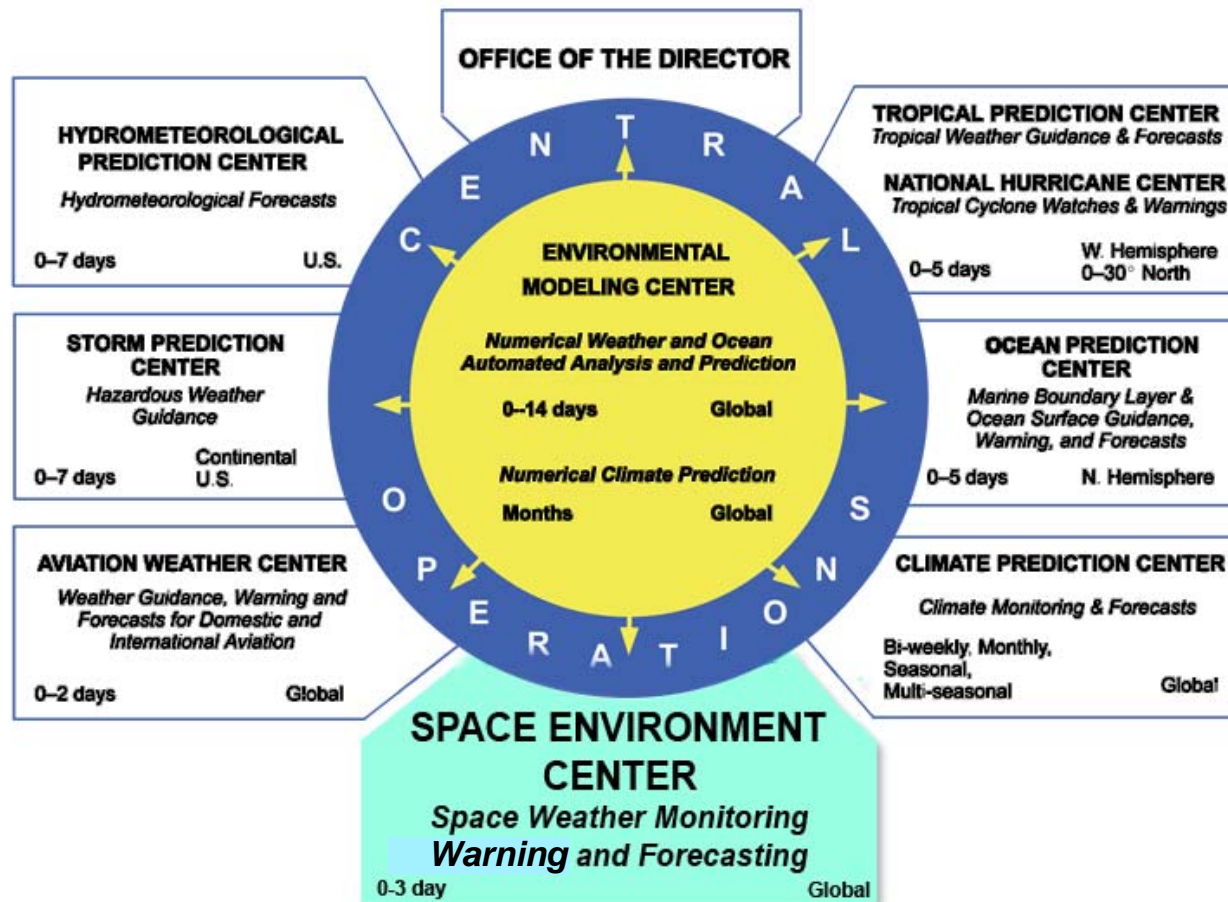
Environmental Data Requirements

REQUIREMENTS: Satellite Observations				SYSTEM: GOES R				CATEGORY: Atmosphere					
GOES R REQ ID #	Observational Requirement	User & Priority (LO-#)*	LEVEL	Geo Cov (G, H, C, M)/ Conditions	Vertical Res.	Horizontal Res.	Mapping Accuracy	Minmt. Range	Minmt. Accuracy	Refresh Rate/ Coverage Time	Data Latency	Long-term Stability	CCR #
3.4.4 AEROSOLS													
3.4.4.1	Aerosol Detection: CONUS (including Smoke and Dust)	GOES R Baseline	T	C	1 km	2 km	1 km	1-10 miles	within 1 mile	60 min	15 min	td	As per Jim Heil, 021104
			O	C	1 km	1 km	0.2 km	1-10 miles	within 1 mile	15 min	3 min	td	
		NWS/NCEP/AVIC-1	T	C	1 km	2 km	0.5 km	1-10 miles	within 1 mile	15 min	3 min		
			O	C	1 km	1 km	0.2 km	1-10 miles	within 1 mile	15 min	3 min		
		OARI/AOML/HRD-2	T	C	tds	2 km	1 km	tds	tds	15 min	15 min		
			O	C	tds	2 km	1 km	tds	tds	15 min	15 min		
3.4.4.2	Aerosol Detection: Hemisphere (including Smoke and Dust)	GOES R Baseline	T	FD	1 km	2 km	1.0 km	1-10 miles	within 1 mile	60 min	3 min	td	NWS-8
			O	H	1 km	0.5 km	0.2 km	1-10 miles	within 1 mile	10 min	3 min	td	
		NWS/NCEP/AVIC-1 NES DIS/OS DPD-1/2 NES DIS/ORA-3	T	H	1 km	2 km	0.5 km	1-10 miles	within 1 mile	15 min	3 min		
			O	G	1 km	1 km	0.2 km	1-10 miles	within 1 mile	15 min	3 min		
		NWS/MFO-1 NWS/NCEP/EMC-1 OARI/AOML/HRD-2	T	H	tds	2 km	1 km	tds	tds	15 min	15 min		
			O	G	tds	2 km	1 km	tds	tds	15 min	15 min		
		OARI/FSL-3	T	H	1 km	2 km	0.5 km	tds	tds	15 min	5 min		
			O	H	1 km	0.5 km	0.2 km	tds	tds	10 min	5 min		
3.4.4.3	Aerosol Detection: Mesoscale (including Smoke and Dust)	GOES R Baseline	T	M	tds	2 km	1 km	tds	tds	15 min	15 min	td	
			O	M	tds	2 km	1 km	tds	tds	15 min	15 min	td	
		OARI/AOML/HRD-2	T	M	tds	2 km	1 km	tds	tds	15 min	15 min		
			O	M	tds	2 km	1 km	tds	tds	15 min	15 min		
3.4.4.4	Aerosol Particle Size	GOES R Baseline	T	FD	Total Column	2 km	1.0 km	tds	tds	15 min	5 min	td	As per Pam 121203
			O	H	0.5 km	0.5 km	0.2 km	tds	tds	10 min	5 min	td	
		NES DIS/ORA-3	T	H	Total Column	2 km	tds	tds	tds	tds	15 min		As per Pam Taylor/Monica Coakley 121203
			O	G	0.5 km	0.5 km	tds	tds	tds	tds	5 min		
		NWS/MFO-1 NWS/NCEP/EMC-1 OARI/FSL-3	T	H	1 km	2 km	0.5 km	tds	tds	15 min	5 min		NWS-8
			O	H	1 km	0.5 km	0.2 km	tds	tds	10 min	5 min		
		DoD USN-USMC-1	T	H	Std-4.5km: 150 m > 4.5 km: 300 m	10 km	tds	0-30 km	Std-4.5km: ±0.5 >4.5 km: ±1.0	60 min	15 min		
			O	tds	tds	tds	tds	tds	tds	tds	tds		
		Climate/NIST - UA (Aerosols - Effective Radius)	T	C									NIST mfg
			O	C					greater of 0.1 or 10% / 0.1			greater of 0.05 or 5% / 0.05	
GOES R P31 (3.5.1.1)	Aerosol Particle Size: Global	DoD USN-USMC-1	T	G	Std-4.5km: 150 m > 4.5 km: 300 m	10 km	tds	0-30 km	Std-4.5km: ±0.5 >4.5 km: ±1.0	60 min	15 min		
			O	tds	tds	tds	tds	tds	tds	tds	tds		

How Do We Get There From Here?

<u>Sensor</u>	<u>EDR</u>	<u>Industry</u>	<u>2012 Goal</u>	<u>Plans</u>
Lightning Mapper	Total Lightning Over Ocean/Land	Public Safety/ Recreation	Reduce Injuries, Deaths	?
Low Light Imager	Fluorescence	Eco-System Management	Biomass Sustainability	?
HES	Aerosol Detection	Health	Expand AQ Monitoring and Prediction	?
Advanced Baseline Imager	Vegetation Index	Agriculture/ Energy	Increased Crop Production/ Reduce Power Outages	?
Solar Imaging Suite	Solar X-ray	Aviation	Improve Navigation & Safety	?

National Centers for Environmental Prediction



Air Quality Forecasts



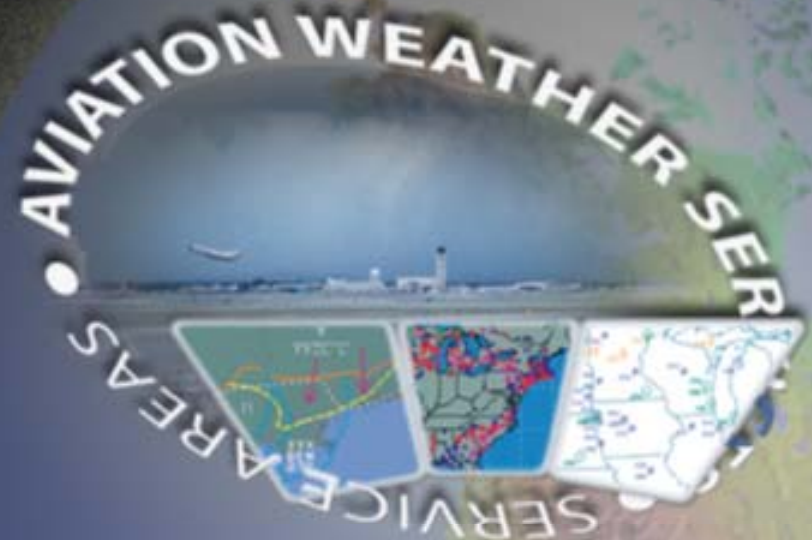
Vision:

- Protect lives, property and health by providing an air quality forecast for the U.S.
 - **Ozone in northeast U.S. by 2005**
 - **Ozone nationwide by 2009**
 - **Aerosols by 2012**
- Partnerships

Aviation Services

Vision:

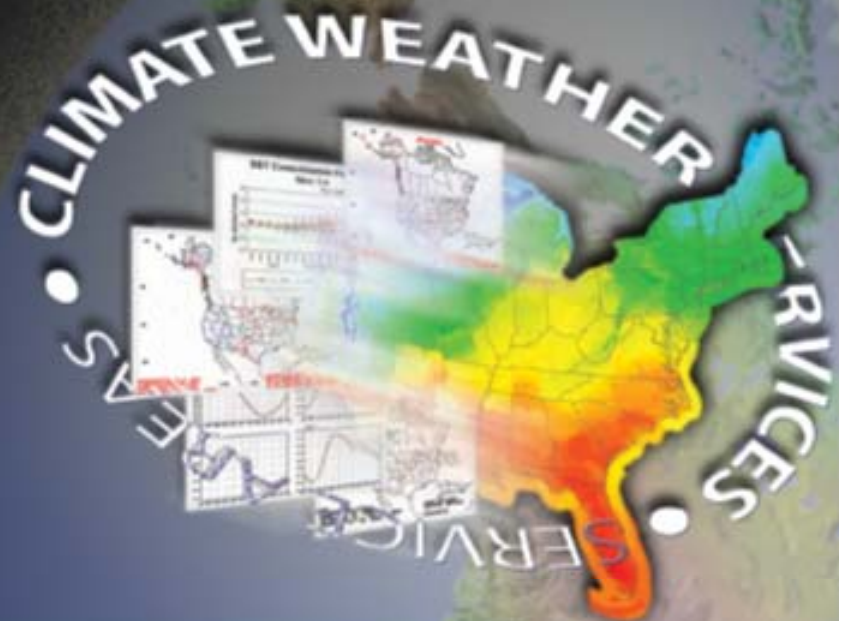
- Support FAA's safe and efficient National Airspace System.
 - Increase use and effectiveness of environmental information.
 - Reduce number of accidents.
- Low Ceiling and Visibility
 - Issue accurate warnings an average of 6 hours in advance for specific airports to provide aircraft enough time to reschedule and/or reroute to avoid hazardous conditions.
- Turbulence and Icing
 - Issue accurate warnings an average of 5 hours in advance along flight corridors to allow aircraft to reroute around dangerous areas.



Climate Services

Vision:

- An end-to-end system of integrated global information of key atmospheric, oceanic and terrestrial variables.
- Issue reliable probabilistic forecasts.
- Predict climate variability and change, at time and space scales relevant to ecosystem models.



Hydrologic Services

Vision:

- Water Resources
 - Provide high-resolution water and soil moisture information and forecasts where and when needed.
- Flash Floods
 - Increase warning lead time for counties to as much as 1 hour.
- Water Quality
 - Provide reliable surface and sub-surface water quality forecasts.



HYDROLOGIC WEATHER SERVICE
• SERVICE AREAS

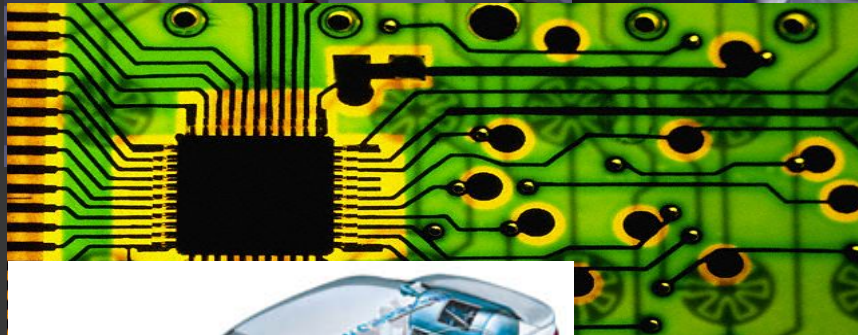
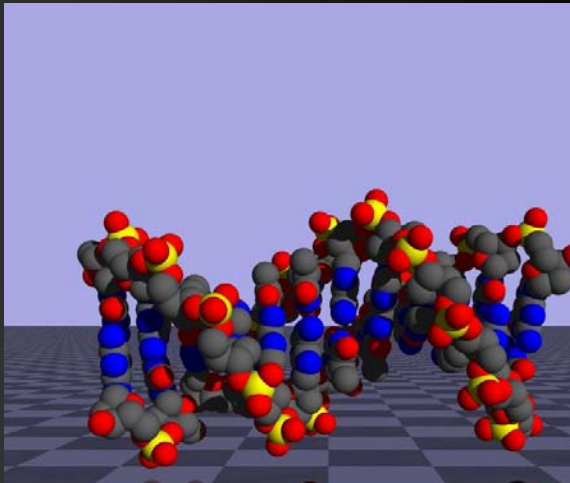
Public Weather Service

Vision:

- Through teamwork, reach every person in the nation with information when and where needed.
- Satisfy customer and partner requirements for consistent, timely, and accurate weather services, products, forecasts, and warnings.
- To support evolving services to support national needs.



What Will 2022 Demand of Us?

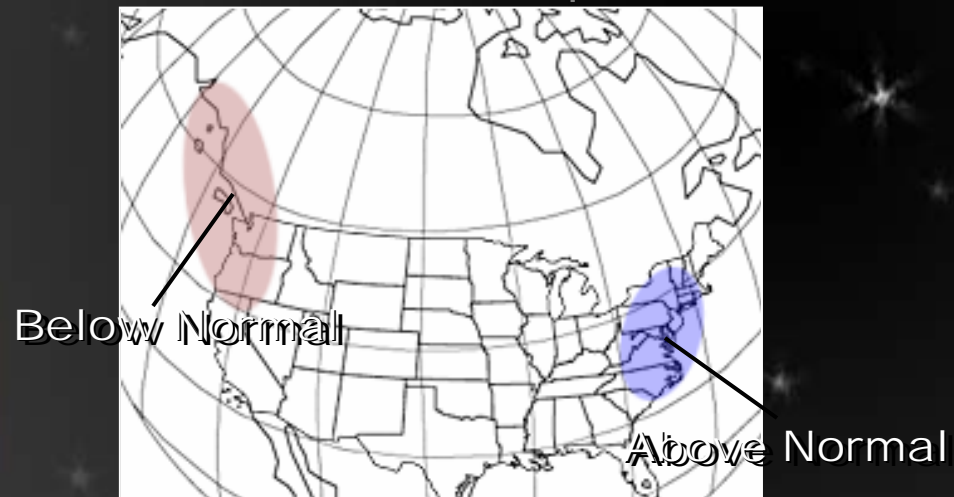


Environmental Services



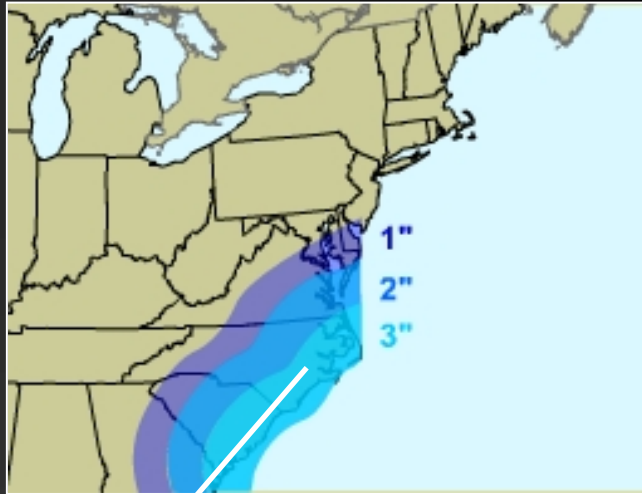
Event Scenario

Seasonal Precipitation



Event Scenario

Seasonal Precipitation



Historical Precipitation Event
Total Precipitation May 2-5 19xx

US Hazard Assessment

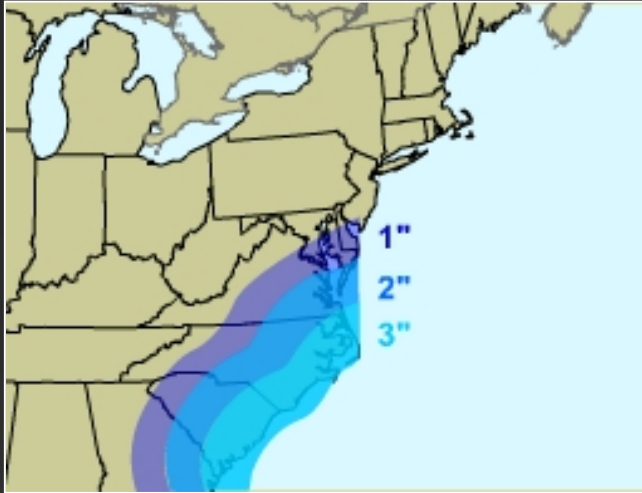
Long Term
Drought Persists



Local Heavy Rain
Flooding Jun 18-22

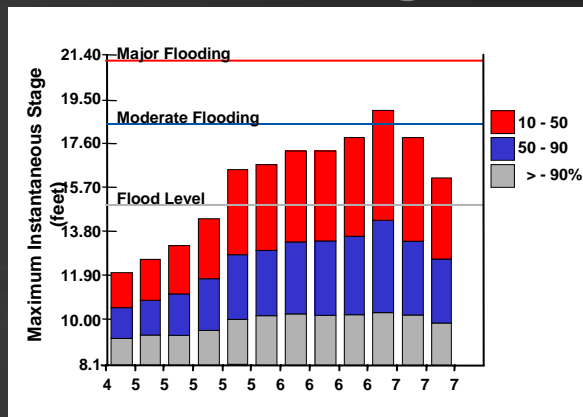
Event Scenario

Seasonal Precipitation

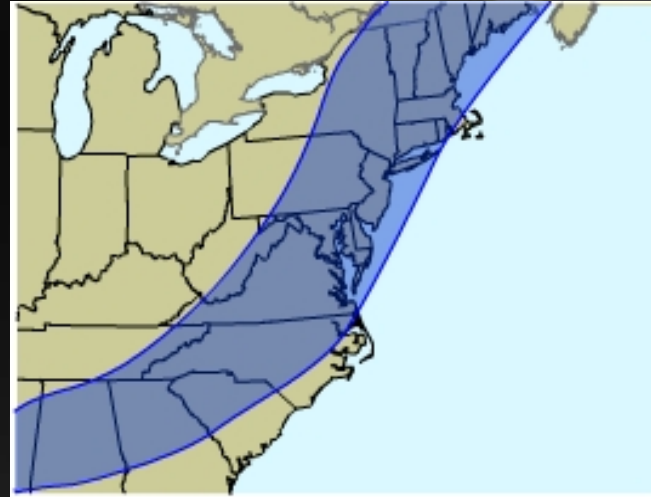


Historical Precipitation Event
Total Precipitation May 2-5 19xx

Potomac Stage

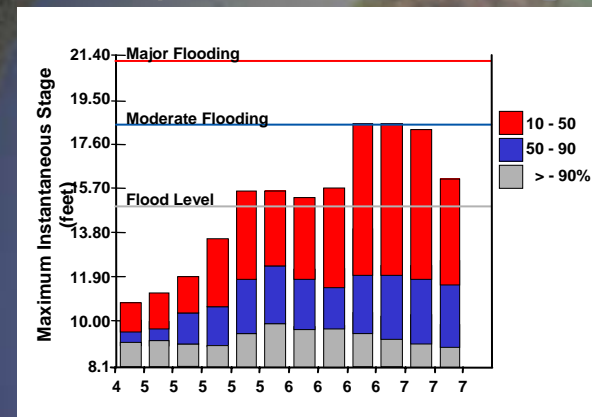


US Hazard Assessment



Storm Track
Jun 18-22
70% Probability

Susquehanna Stage



Upper Chesapeake Bay Ecology

Nutrient Loading



Turbidity



Salinity



Oyster Mortality



America Needs You to Deliver!

